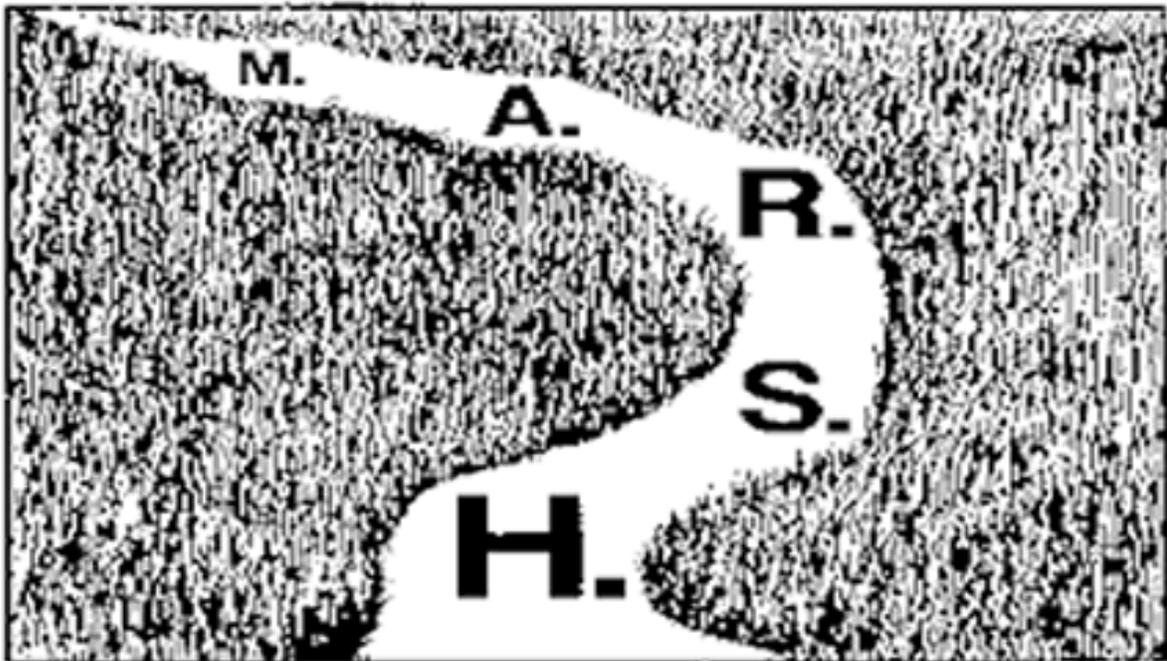


National Park Service  
U.S. Department of the Interior

Gulf Islands National Seashore  
Ocean Springs, Mississippi



# A Self-Guided Environmental Education Program for the Nature's Way Trail at Davis Bayou



## WELCOME

**M.A.R.S.H.** is an educational program designed for use by teachers, scout leaders, and others who are bringing groups of children to the Davis Bayou Area of Gulf Islands National Seashore. The program has three components:

- \* Lessons and worksheets for use in the classroom before the field trip.
- \* A five-parted activity package for use on the Nature's Way Trail at Davis Bayou.
- \* For review, exercises to be completed after returning to the classroom.

The purpose of M.A.R.S.H. is to help children learn about the ecology of Mississippi's coastal marshes and forests, and to introduce them to the resources of Gulf Islands National Seashore.

Groups and individuals planning visits to Davis Bayou will need to know the following information.

- \* The Davis Bayou Area is part of Gulf Islands National Seashore and is managed by the National Park Service.
- \* All plants and animals at Davis Bayou are protected by law. This means that visitors are encouraged to observe, study, and appreciate what they see, but picking, collecting, and otherwise disturbing living things are forbidden.
- \* Facilities at Davis Bayou include the William Colmer Visitor Center, where visitors will find exhibits, restrooms, water fountains, an auditorium, and a bookstore; a fishing pier; a boat launch; a campground; picnic areas, and the self-guided nature trail where the activities in M.A.R.S.H. are carried out.
- \* A twelve-minute orientation film, "Tides, Winds, and Waves" is shown several times daily at the Colmer Visitor Center. To arrange a screening of the film for your group, call 228-875-0074.

## WHAT TO BRING

Sunscreen  
Sunglasses  
sun hats  
insect repellent  
a first-aid kit  
binoculars  
magnifying lenses  
a camera to record your field trip's highlights  
snacks, drinks, and lunches

## **BEFORE YOU GO**

So that students may gain advance knowledge of Gulf Islands National Seashore and its coastal marshes and forests, lessons and worksheets are provided. These are master copies, and leaders may reproduce them in the numbers they require. Students in the upper grades will be able to read the materials and complete the worksheets with little assistance. Younger pupils will require some additional instruction and coaching.

To make the most of your M.A.R.S.H. field trip, we advise that you recruit a team of volunteers to assist you. You will want to meet with your volunteers in advance of the trip to acquaint them with the program and to assign them responsibility for particular activities. The better prepared you are before the trip, the more smoothly the day will go and the more your students will learn, enjoy, and remember.

Each student will need one or more writing implements to complete the worksheets. Pencils and felt-tip pens serve best. If you choose pencils, be sure to bring several small, hand-held sharpeners. Crayons become soft on hot days and are not recommended.

Students will need drawing boards on which to record their findings. We recommend having the students prepare the boards themselves in the classroom. Cut pieces of stiff cardboard 8 1/2 by 11 inches or larger and, using paper fasteners, attach a complete set of five worksheets to each.

## **AT DAVIS BAYOU**

The best place along the Nature's Way Trail to carry out the M.A.R.S.H. program begins with Stop #5 on the trail (see the self-guided pamphlet for the Nature's Way Trail) and continues through Stop #9. We recommend having one or more adult volunteers positioned at each station and moving the groups between them. For the leader in charge, a sound-making device such as a police-style whistle will come in handy for announcing the start and finish of each activity period.

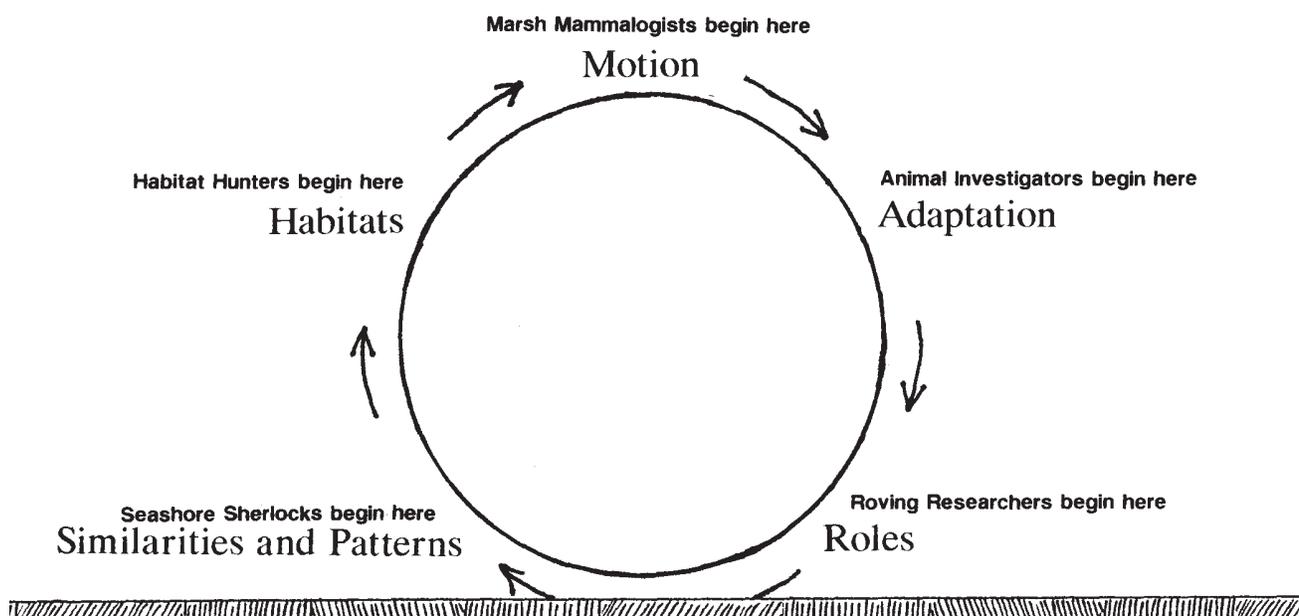
Safety concerns: Group leaders are advised to bring first aid kits and be familiar with any special allergies or sensitivities of their students. At Davis Bayou, as in the rest of the Southeast, bees, wasps, fire ants, spiders, and venomous snakes are part of the natural environment. The best ways to avoid them are to stay on marked footpaths, keep hands out of dark places, watch where you step, and stay a safe distance from all stinging insects, spiders, and snakes. Poison ivy, a native vine, and poison sumac, a native shrub, are common at Davis Bayou. Their berries are important sources of food for migratory birds passing through our area on the way to winter homes in Central and South America. Teach your students to recognize and avoid contact with poison ivy by remembering the rhyme, "Leaves of three, let it be." Contact with poison sumac is avoided by staying on marked footpaths.

Management concerns: Running a National Park is a big job. More than five million visitors come to Gulf Islands National Seashore every year, and each of them can have an impact—for good or for ill—on the park’s wildlife. Make sure your students know that all the plants and animals at Gulf Islands are protected by law. This means that picking flowers or leaves, removing natural materials, feeding alligators or raccoons, killing snakes, and taking animals home as pets are not permitted. Visitors are encouraged, however, to observe, explore, and enjoy. Teachers and students interested in helping the park may bring garbage bags and collect any litter they find along the trail.

Five activities make up the field trip program. Although they may be completed in sequence by a class working as a single unit, we recommend that the activities be undertaken in five sub-groups divided as follows:

- \* The Marsh Mammalogists, with yellow name-tags
- \* The Animal Investigators, with white tags
- \* The Roving Researchers, with red tags
- \* The Seashore Sherlocks, with blue tags
- \* The Habitat Hunters, with green tags

The five sub-groups can complete the activities consecutively, in a round robin format. Each begins with one activity and progresses to the next in the sequence until all five activities have been completed. The length of time devoted to each activity is determined by the teacher. We recommend that a minimum of 12 minutes (more if available) be allowed for each, with a three-minute change-over time between activities. The groups will rotate as follows:



## **“M” IS FOR MOTION**

Invite the students to look for things that move. This may be easy—a variety of birds, mammals, insects, and fluttering leaves may be visible at once—or it may be difficult if the forest is quiet. Remind the students that wildlife observation requires patience. Look high, look low, look in the sky, and look on the ground. Spend the second half of the activity period sketching the things you saw on the “M” is for Motion worksheet.

## **“A” IS FOR ADAPTATION**

While the students look over their “A” is for Adaptation worksheets, discuss some of the ways plants and animals are adapted to survive in their environments. To give a few examples, discuss how trees grow tall trunks that place their leaves in the sunshine, that lizards have tough scaly skin to prevent them from drying out (unlike salamanders, which look superficially like lizards but have thin moist skin and can only live in places that are very moist), and how some birds and butterflies have bright colors that help them to attract mates. Next, have the students look around them and find other adaptations. Finally, on the “A” is for Adaptation worksheet, have the students circle the adaptations they have observed along the trail.

## **“R” IS FOR ROLES**

Review the definitions of producers, consumers, and decomposers. Producers are green plants that, using the chlorophyll in their leaves, harvest energy from the sun and use it to manufacture sugars. Consumers are animals and other organisms (such as parasitic fungi and bacteria) that get their energy by digesting the living tissues of producers. Decomposers are specialized consumers which survive by digesting the tissues of non-living producers and consumers. Examples of decomposers: ants, carrion beetles, flies which lay their eggs in rotting flesh, turkey vultures, and many fungi. By breaking down dead organisms into simple compounds, decomposers help provide the fertilizers that producers need to flourish. Next, have the students find producers, consumers, and decomposers in the area around them and sketch their discoveries on the worksheet.

## **“S” IS FOR SIMILARITIES AND PATTERNS**

One of the most important ways that scientists make sense of the world is to search through the apparent chaos of things for underlying similarities and patterns. Tell the students that they are scientists, and have them search for the patterns listed on the “S” is for Similarities and Patterns worksheet. In the spaces provided, have them sketch or write the names of the items they have discovered.

## “H” IS FOR HABITATS

Discuss the meaning of habitat. Tell the students that a habitat is more than just a plant or animal’s home; it is the geographical circle within which the plant or animal finds its air, water, food, and shelter. Have each student imagine that he or she is an animal of the forest. Possibilities include: raccoon, armadillo, swamp rabbit, gray squirrel, blue jay, red-bellied woodpecker, green anole, speckled kingsnake, evening bat, screech owl, narrow-mouthed toad, slimy salamander, earthworm, butterfly, ant. In the area immediately around the study station, have the students find places where all their requirements for living can be fulfilled. Conclude by having the students draw their animals on their worksheets and fill in the blanks at the bottom.

### BACK AT SCHOOL . . .

Assemble your group for a sharing session. Invite children to discuss their impressions of Davis Bayou and to consider how their impressions differed from their expectations before the trip. Ask if any of the children have visited other National Parks and invite them to share their perceptions of how the other parks differed from Gulf Islands National Seashore.

If necessary, complete any of the worksheets that need additional attention. You may want to have the students design covers for their worksheets. The covers could be stapled to the worksheets to form books.

Review the lessons and concepts in the pre-trip material and discuss the terms on the M.A.R.S.H. WORDS sheet. Then have students complete the M.A.R.S.H. crossword puzzle.

Conclude M.A.R.S.H. by discussing the importance of coastal marshes and forests to plants and animals, including humans. Leave students with the idea that protecting places like Davis Bayou is a job we all share.



# Food for Thought: Lessons for the Classroom

During your M.A.R.S.H. field trip, you and your class will visit two distinct habitats: a salt marsh and a coastal forest. A habitat is defined as the geographical area within which a living thing supplies all of its needs. (For most organisms, these needs are air, water, food, and shelter.) A great number of living things find their needs in salt marshes and coastal forests, and you will have a chance to observe many of them.

## The Salt Marsh: Plants

The salt marsh you visit during the field trip is an arm of Stark Bayou. (The word “bayou” has different meanings in different places. Along the Mississippi coast, “bayou” usually means a shallow, slow-moving body of salty, brackish, or fresh water that is affected by the tides.)

A salt marsh is a kind of wetland. Other wetland types include freshwater marshes, salt swamps, and freshwater swamp. While the names “marsh” and “swamp” are sometimes used interchangeably, they do not mean the same thing. A marsh is a wetland where the dominant plants (those which are most conspicuous) are herbaceous, or soft-stemmed, species such as grasses, sedges, and rushes. If a marsh has salt water in it, it is called a salt marsh. If a marsh has fresh water in it, it is called a freshwater marsh. A swamp, on the other hand, is a wetland where the dominant plants are woody-stemmed (i.e. trees and shrubs). Salt swamps are found along coasts throughout the tropics; they are best known for their tangled masses of mangrove trees. Freshwater swamps are not salty and are found inland. The best known freshwater swamp in America is the vast Okefenokee Swamp that sprawls across the Georgia-Florida border. Freshwater swamps in the southeastern United States are usually characterized by trees such as tupelo, red maple, and bald-cypress.

The salt marsh at Stark Bayou sometimes gives off an unpleasant odor. This “fragrance” is a result of natural decomposition and does not mean the marsh is polluted. Because of the smell of salt marshes and because people have a difficult time moving through them and living in them, salt marshes were long considered worthless places, and many of them were drained, filled, or used as sites for dumps and factories. In recent years, however, people have begun to recognize salt marshes as valuable resources. Scientists have shown that salt marshes produce a greater mass of living material than any other environment on Earth! It has also been found that virtually all the fish caught by the commercial fishing industry spend part of their lives in salt marshes.

A variety of plants and animals inhabit the salt marsh you will visit during your field trip. Among the plants are *Spartina*, or salt marsh cordgrass, which can survive in the marsh by extracting fresh water from salt water, and black needle rush, which has long needle-like leaves with sharp points on the end. Hundreds of different kinds of plants grow in the forest fringing the marsh, but in the marsh itself, only two species—*Spartina* and black needle rush—manage to thrive. When these plants die, their rotting leaves and stems turn the waters around them into a sort of marsh “soup,” and this soup supports the marsh’s abundant animal life.

## The Salt Marsh: Animals

Among the animals of the salt marsh are the fiddler crab, the alligator, the clapper rail, the rice rat, and the raccoon.

The fiddler crab is a small crab that inhabits burrows in the mud. Females have claws that are the same size as each other, but on male fiddler crabs, one of the first set of claws is greatly enlarged. This makes it appear that the crab is playing a violin or fiddle.

The alligator is a large, potentially dangerous reptile. It resembles a lizard but actually belongs to an ancient group of reptiles known as the crocodylians. Alligators are predators and feed on any small animals they can catch. Feeding alligators is dangerous and illegal.

The clapper rail is a brown and gray bird that in size and shape may remind you vaguely of a chicken. It has a long narrow bill which it uses to pick up small crabs, insects, and other invertebrate animals. Most of the time clapper rails are hard to see because they are hidden by the marsh grasses. You can detect their presence by listening for their call, a loud kek-kek-kek-kek.

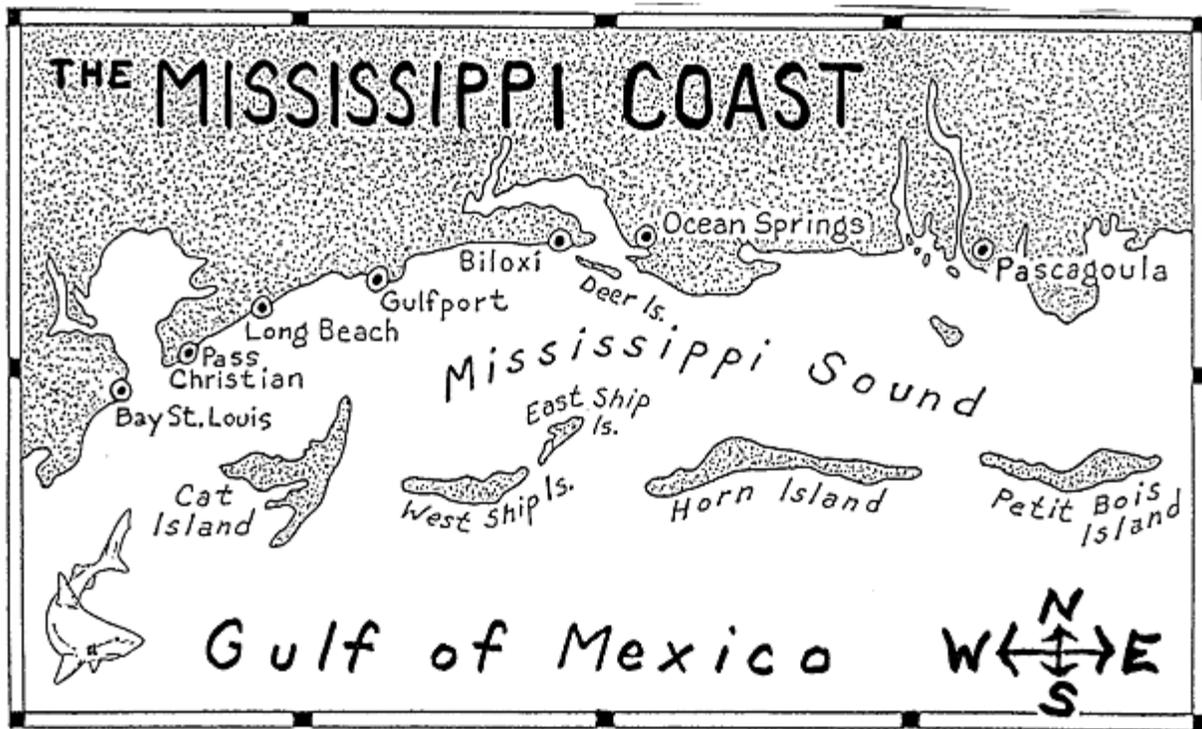
The rice rat is a medium-sized rodent (up to 12" long) that is native to marshes in the southeastern states. It is gray-brown in color, has a long tail, and feeds on plants, fruits, crabs, insects, snails, and fungi.

The raccoon is a mammal that roams the edges of the salt marsh hunting for crabs, snails, fish, and other small creatures to eat. Easy to recognize, the raccoon has brown fur, a black mask, and a banded tail. It is active mostly at night.

## The Salt Marsh: A Few More Facts

Each day, the water in the salt marsh rises and falls. The time of high water is called "high tide" and the time of low water is called "low tide." Tides are caused by the gravitational pull of the moon and sun on the Earth.

The reason you and your class will find a marsh rather than a sandy beach in the mainland portion of Gulf Islands National Seashore is that barrier islands lie off the coast, blocking the approach of ocean waves. Waves create beaches by battering a shoreline, uprooting plants and sending up a salt spray that kills off plants. The names of the barrier islands are Cat, West Ship, East Ship, Horn, and Petit Bois. All are part of Gulf Islands National Seashore. The National Park Service takes the job of protecting the barrier islands very seriously, because barrier islands can easily be washed away if too much building or other human activity occurs on them. Without the barrier islands, coastal marshes such as the one at Stark Bayou could not exist.



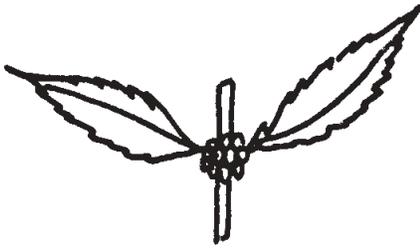
The body of water that lies beyond (south of) the barrier islands is known as the Gulf of Mexico. The water lying between the islands and the mainland is called the Mississippi Sound.

## The Coastal Forest: Plants

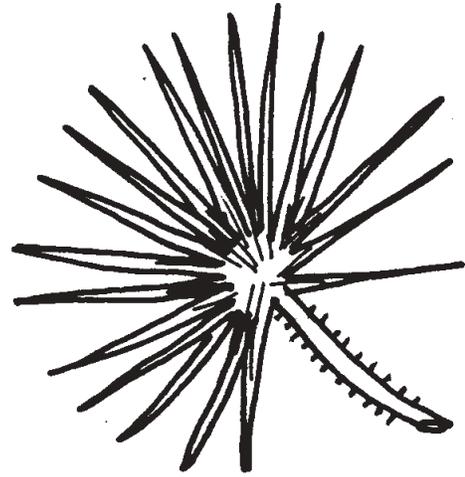
During your field trip to Davis Bayou, you will visit a magnificent area of coastal forest. The trees here are a mix of evergreen and deciduous (ones that lose their leaves for part of the year) species. The most common evergreen is the loblolly pine. This tree has long, needle-like leaves that attach to the twigs in bundles of three; its cones have sharp points on their scales, and if you squeeze one you will immediately say "Ouch!" Loblolly pines were so named because they often grow in low wet places called loblollies. Among the deciduous trees of the forest are red oak, tupelo, and American beech.

Beneath the tall trees in most forests you will usually find smaller, shade-tolerant plants. These plants are collectively referred to as the forest's "understory." Along the Nature's Way Trail the understory includes wax myrtle, saw palmetto, and Spanish moss.

Wax myrtle is an evergreen shrub (bush) with thick, leathery leaves. When the leaves are torn or bruised they give off a strong, sweet smell much like the fragrance of bayberry. (Wax myrtle and bayberry are closely related to each other.) The berries of wax myrtle are eaten by many birds, including the myrtle, or yellow-rumped, warbler. Long ago, people often collected wax myrtle berries, boiled them to extract their wax, and made the wax into candles.



Wax Myrtle



Saw Palmetto

Saw palmetto is a member of the palm family. You will recognize it by its sawtoothed stem and the long narrow leaves that fan out from the stems like the feathers of a turkey tail. The dark shady places beneath saw palmettos make fine hiding places for small animals, including snakes, so be especially careful when walking among them.

Spanish moss is an epiphyte (a plant that grows on other plants). It looks something like a moss but is actually a member of the pineapple family.

## The Coastal Forest: Animals

A variety of animals are common in the forest along the Nature's Way Trail. Among them are the slimy salamander, the speckled kingsnake, the green anole, the blue jay, the red-bellied woodpecker, the armadillo, and the gray squirrel.

The slimy salamander is an amphibian. It looks vaguely like a lizard but has smooth slimy skin and can live only in damp places. The slimy salamander is black with small white spots and spends most of its time hunting for insects in the soil. Don't handle one, because the slime will stick to your skin and is almost impossible to wash off.

The speckled kingsnake is a black snake marked with lots of small white spots. It lives on the ground where it hunts mice, rats, birds, lizards, and other snakes. Kingsnakes are the called kingsnakes because they are immune to the venom of poisonous snakes, which they sometimes catch and eat.

The green anole is a small, slender lizard that can change color like a chameleon. It lives in the forest where it hunts for insects to eat. Many larger animals try to catch and eat green anoles, so the ability to change color is especially important in helping the lizards to survive.

The blue jay is a medium-sized, blue-gray songbird with a loud call that sounds like someone saying "Jay, Jay!" It feeds on a variety of things, including fruits, seeds, insects, small reptiles, and the eggs of other birds.

The red-bellied woodpecker is a medium-sized woodpecker with a black and white striped back. Surprisingly, it does not have a red belly, at least that you can see. The bird was named by early ornithologists who, lacking modern binoculars, shot birds in order to look at them. When examined closely, the pale plain belly of this woodpecker exhibits a faint wash of red.

The armadillo is a mammal that looks like it is wearing a coat of armor. It has a scaly outer covering (something like a turtle's shell) and a long tail. In the forest you may not see an armadillo, but you will probably see places where armadillos have dug in the leaves and soil for insects.

The gray squirrel is a tree-climbing rodent with a long furry tail that helps it balance on branches. It is chiefly a plant eater and feeds on buds, inner bark, fruits, nuts, and seeds. By burying acorns in the soil, gray squirrels help to plant oak trees.

## **Producers, Consumers, and Decomposers**

During your field trip, each of the living things you see—the plants, the animals, the mushrooms and other fungi—can be placed in one of three groups:

\*The Producers: these living things are plants which have a green substance called chlorophyll in their leaves; they harvest energy from the sun and use it to make sugars; the sugars produced by producers provide (directly or indirectly) the food that supports all other living things.

\*The Consumers: consumers are animals and other organisms that either eat producers or eat other consumers that eat producers; they do not have chlorophyll in their cells; you are a consumer

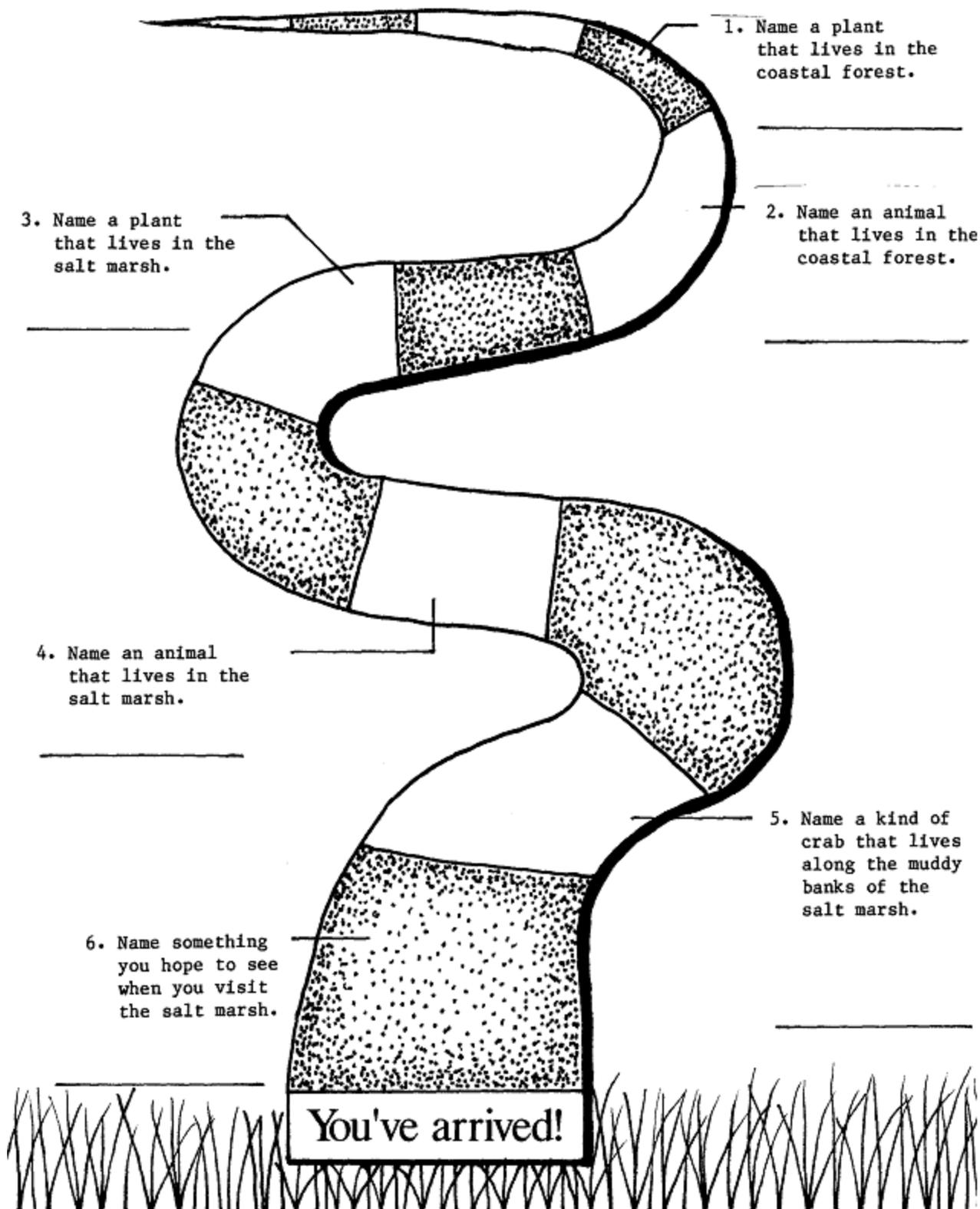
\*The Decomposers: these are specialized consumers that feed on dead producers and consumers; by breaking down producers and consumers into simple substances, decomposers help to make soil that can nourish a new generation of producers

We hope that you enjoy your visit to Gulf Islands National Seashore. Make sure that it is a safe one by bringing along a first aid kit, staying on marked paths, wearing appropriate clothing, and avoiding direct sun so that tans do not become sunburns. Also be on the lookout for poison ivy, a common plant almost everywhere in the Southeast. Remember the saying “Leaves of three, let it be,” and beware of any vine with hair-like growth on it.

The following activities are provided for use in the classroom.

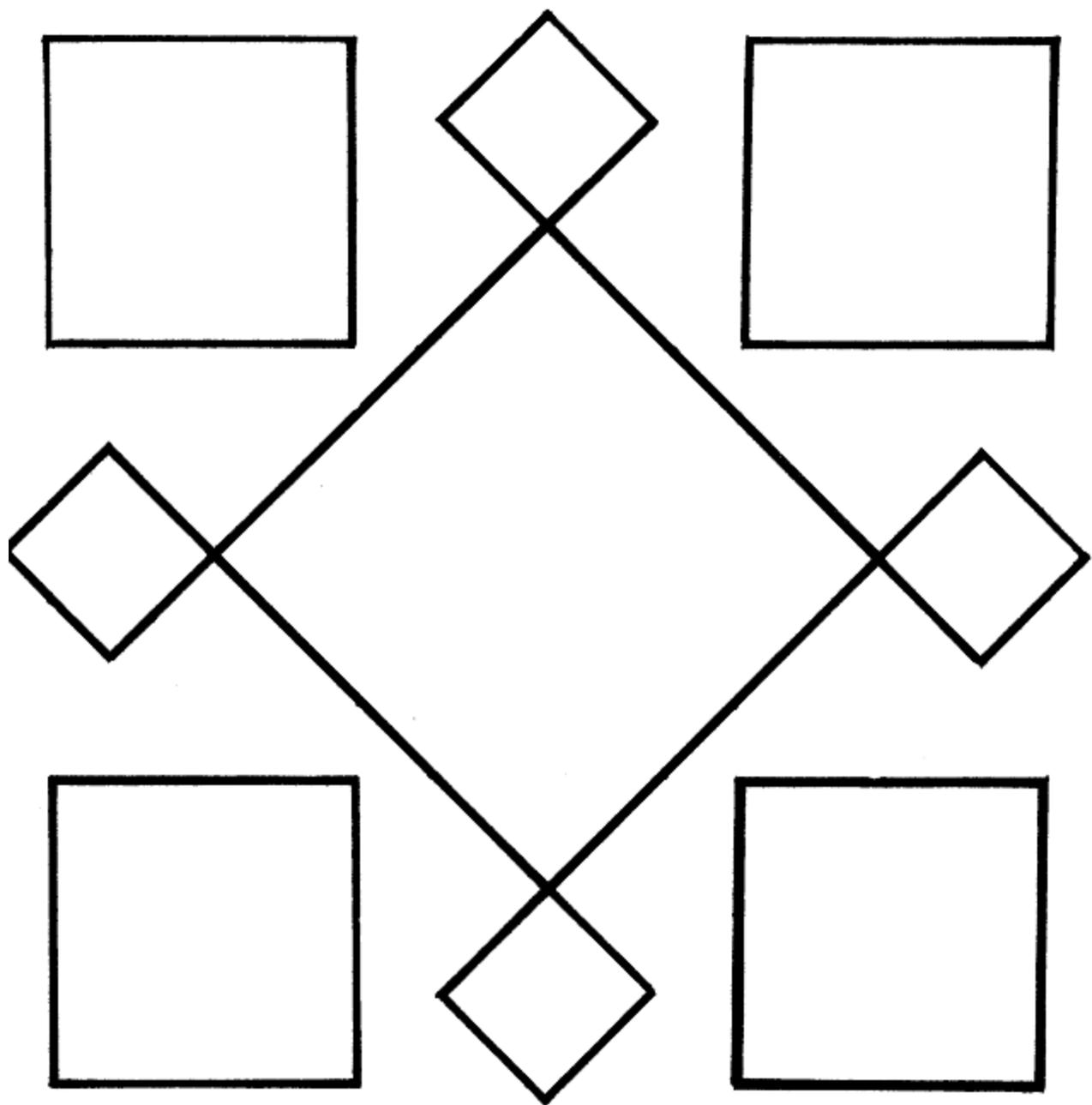
# M.A.R.S.H. MARCH

Answer the following questions on your march to the salt marsh.



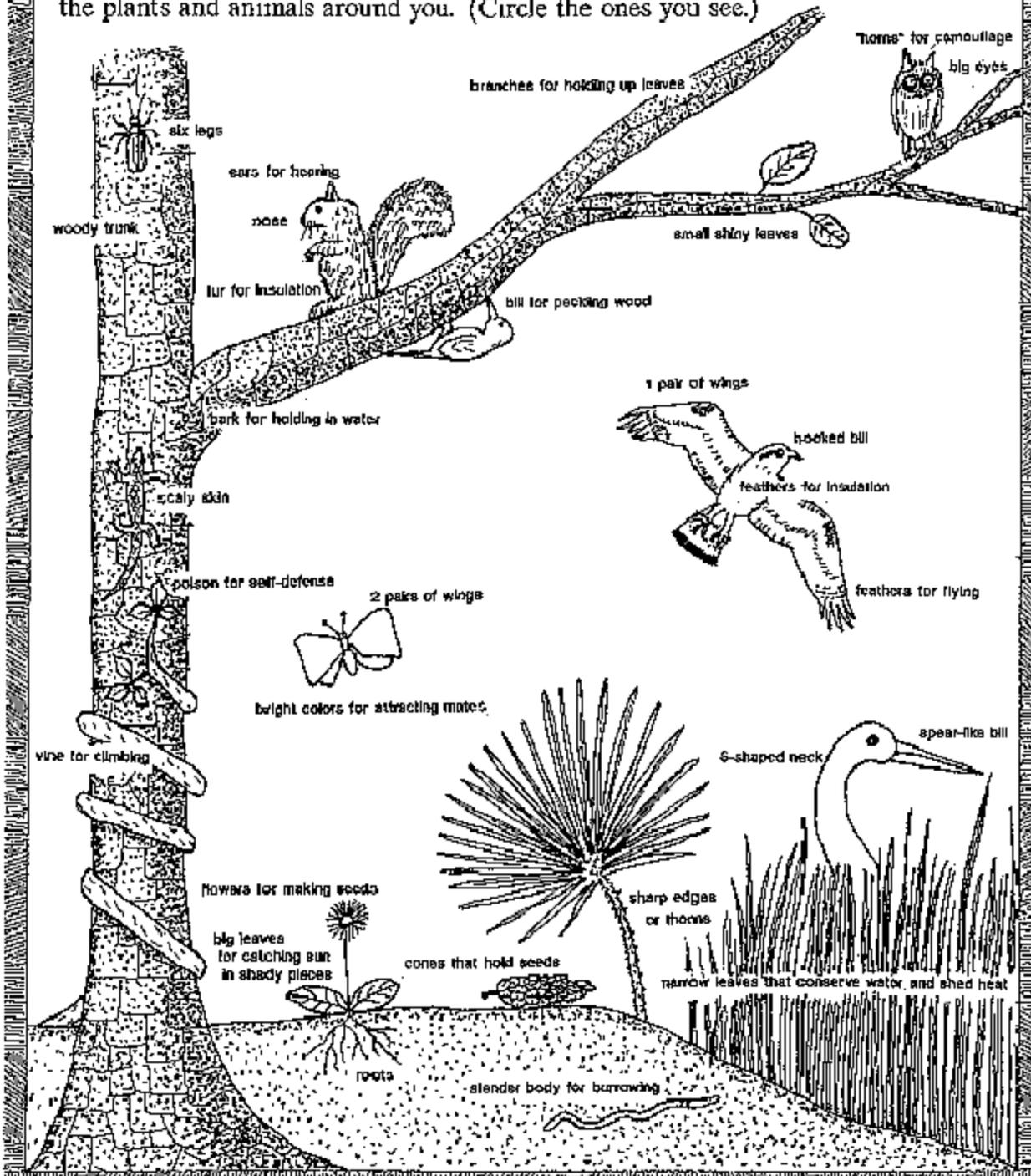
# "M" is for Motion

Look for things that move. Then, in the squares below, write the name or draw each thing you see. Examples: birds, insects, spiders, leaves trembling in a breeze, a seed falling.



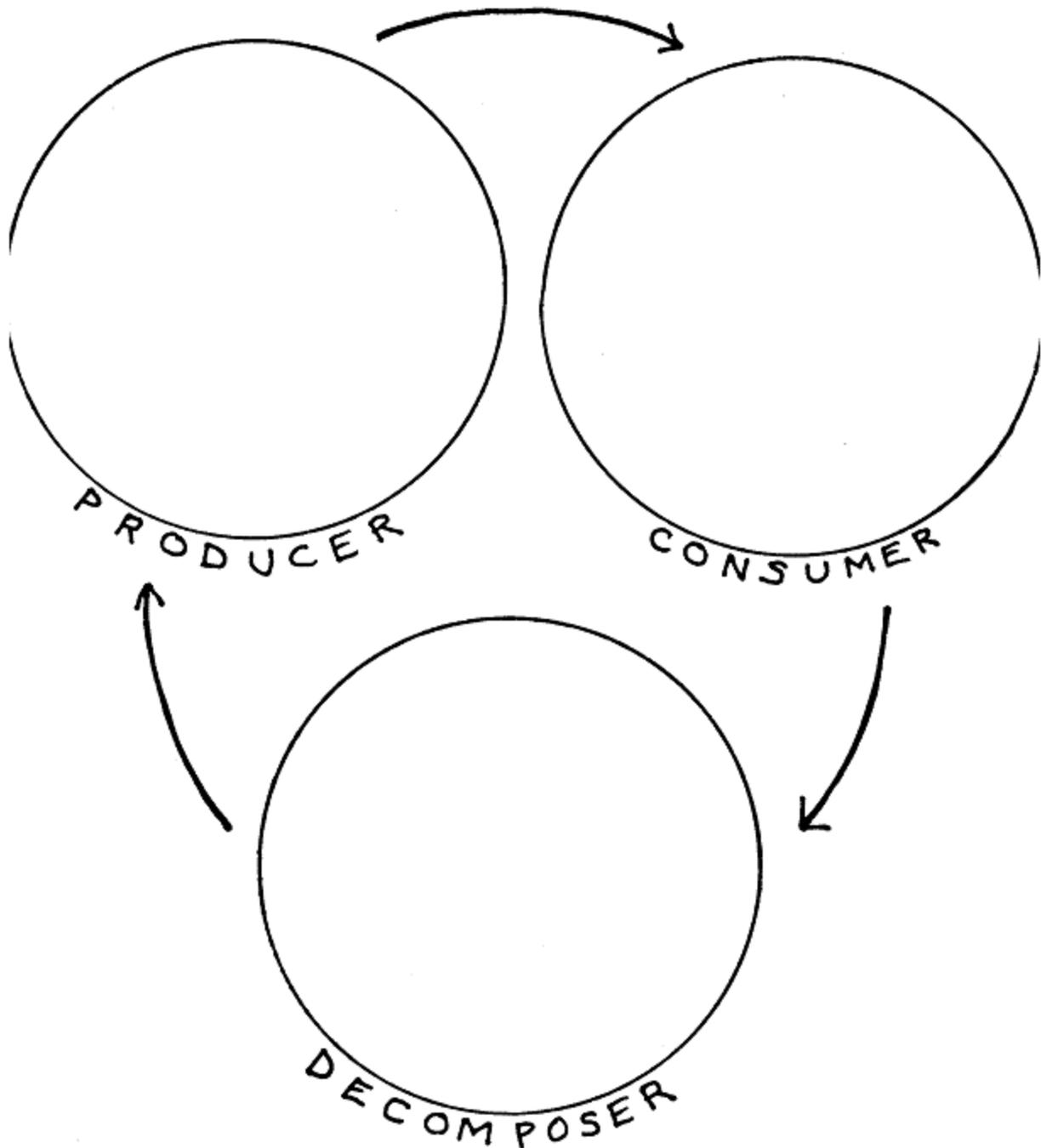
# "A" is for Adaptation

Adaptations help living things to survive. See if you can find these adaptations in the plants and animals around you. (Circle the ones you see.)



# "R" is for Roles

Look around you. Find a producer, a consumer, and a decomposer. Draw a picture of each.



# "S" is for Similarities and Patterns

Can you find the items listed below?

Something round	Something shaped like an X
Something that comes in twos	Something with a wavy pattern
Something that comes in threes	Something with spots
Something that comes in fours	Something with an interesting pattern
Something that comes in fives	Two things that are the same, yet different

# "H" is for Habitats

Pretend that you are an animal of the forest. Draw a picture of your animal here.

I am a(n) \_\_\_\_\_ . I find shelter \_\_\_\_\_

and breathe air with my \_\_\_\_\_ . When I'm thirsty,

I find water \_\_\_\_\_ . I eat \_\_\_\_\_ .

# VISITING A NATIONAL PARK

Some things are permitted in a National Park, and some things aren't.

Write yes or no beside each item on the list below.

\_\_\_ I can take pictures of the things I see.



\_\_\_ I can pick flowers and bring them home.



\_\_\_ I can learn about plants, animals, and their environments.



\_\_\_ I can cut down a tree if I want to.



\_\_\_ To get a close look at an alligator, I can feed it some marshmallows.



\_\_\_ I can ask a Ranger for help if I need it.



\_\_\_ If I don't like snakes and see one, I can kill it.



\_\_\_ I can only get a sunburn in July or August.



\_\_\_ I can see colorful things--flowers, birds, butterflies.

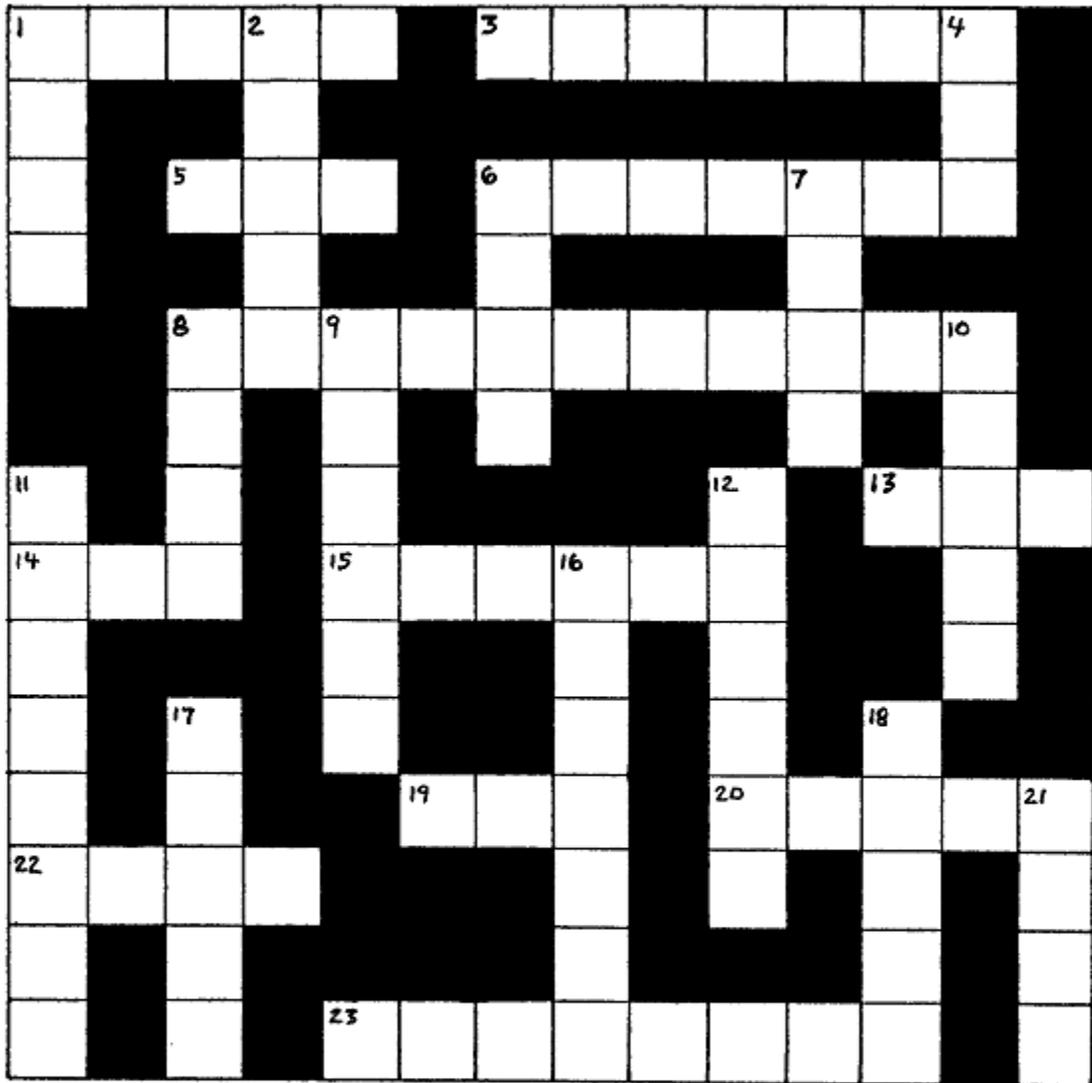


\_\_\_ I can take a walk on a nature trail.



## Can I or Can't I?

# M.A.R.S.H. Crossword



Read the clues and fill in the squares.

# Crossword Clues

## ACROSS

1. A wetland with grasses and grass like plants growing in it is called a \_\_\_\_\_.
3. The place where a plant or animal lives is called its \_\_\_\_\_.
5. The blue \_\_\_\_\_ is a common bird of coastal forests.
6. The \_\_\_\_\_, a mammal with a black mask and banded tail, is sometimes seen hunting along the edges of the marsh.
8. At Davis Bayou, you can find a plant called \_\_\_\_\_ (two words) hanging from the branches of trees.
13. Too much exposure to the \_\_\_\_\_ is bad for your skin.
14. The rice \_\_\_\_\_ lives at Davis Bayou but is seen only rarely.
15. Beyond the Mississippi barrier islands lies a body of water known as the Gulf of \_\_\_\_\_.
19. Another word for 'ocean' is \_\_\_\_\_.
20. A wetland with trees and shrubs growing in it is called a \_\_\_\_\_.
22. The fiddler \_\_\_\_\_ lives in burrows along the edges of the salt marsh.
23. An animal that gets its energy by eating other living things is called a \_\_\_\_\_.

## DOWN

1. Tides are caused by the pull of the \_\_\_\_\_ and the sun on the earth.
2. Same as 20 across
4. Be careful when trying to get a sun \_\_\_\_\_ that you do not get a sun burn.
6. The clapper \_\_\_\_\_ is a common bird of the salt marsh.
7. A healthy marsh may have a bad \_\_\_\_\_.
8. Ocean water contains \_\_\_\_\_.
9. A plant is one kind of living thing; an \_\_\_\_\_ is another.
10. The body of water that lies between the barrier islands and the Mississippi mainland is called the Mississippi \_\_\_\_\_.
11. A green plant is a \_\_\_\_\_.
12. A habitat with many trees growing in it is called a \_\_\_\_\_.
16. Gulf \_\_\_\_\_ National Seashore is managed by the National Park Service.
17. Spartina is a kind of \_\_\_\_\_.
18. A nickname for alligator is \_\_\_\_\_.
21. Saw palmetto is a member of the \_\_\_\_\_ family.

# M.A.R.S.H. Crossword



Answers For Teachers

# M.A.R.S.H. WORDS

<b>barrier island</b>	an island, usually long and narrow, that lies near a coastline and helps protect it from waves and storms.
<b>bayou</b>	a word with different meanings in different places in Mississippi, usually means a slow moving body of salt, brackish, or fresh water that is affected by tides.
<b>consumer</b>	an animal or other organism (such as a fungus or bacterium) that gets its energy not directly from the sun but by feeding on other consumers or producers.
<b>decomposer</b>	a specialized consumer that feeds on dead producers and consumers * decomposers help recycle nutrients so that they can be used again by producers.
<b>forest</b>	a place where the dominant plants are trees and shrubs.
<b>herbaceous plants</b>	plants that have soft stems which die back to the ground in winter.
<b>marsh</b>	a wetland where the dominant plants are herbaceous plants such as grasses, sedges, and rushes.
<b>poison ivy</b>	a climbing vine with hairy stems and three parted leaves* the bark and leaves of poison ivy contain an oil that can cause allergic reactions in humans * poison ivy berries are an important food for migrating birds.
<b>producer</b>	a plant with green leaves that harvest energy from the sun and use it to produce sugars * these sugars, in turn, supply the energy for all forms of life.
<b>soft stemmed plants</b>	see herbaceous plants.
<b>Spartina</b>	a type of grass that thrives in salt marshes all over the world.
<b>swamp</b>	a wetland where the dominant plants are woody stemmed plants such as trees and shrubs.
<b>wetland</b>	a place where the soil is soaked with water much or all of the time, and where rooted plants grow that rise above the high water level.
<b>woody stemmed plants</b>	plants such as trees, shrubs, and certain vines whose stems are sturdy and live from year to year.

National Park Service  
U.S. Department of the Interior

Gulf Islands National Seashore  
Ocean Springs, Mississippi



EXPERIENCE YOUR AMERICA